

REMARKS

Upon entry of the Amendment, Claims 1-15 will be pending in the application.

Claims 1-9 are amended. Claims 1-3 are amended to recite “detaching the mask by disengaging one side edge of the mask disposed over the printed face of the wiring substrate only after the squeegee has passed through three quarters or more of the through hole forming region in the mask, relatively from the printed face.” Support can be found, for example, in the paragraph bridging pages 13-14 of the specification as originally filed. No new matter is added.

Also Claims 1-3 are amended for clarity to recite a “through hole forming region”. Furthermore, Claims 1-9 are amended to change “squeeze” to “squeegee” as the term is commonly known by those skilled in the art. No new matter is added.

New Claims 13-15 are added based on support, for example, in the paragraph bridging pages 13-14 of the specification. No new matter is added.

Entry of the amendment along with reconsideration and review of the claims on the merits are respectfully requested.

Formal Matters

Applicants appreciate that the Examiner has acknowledged Applicants’ claim for foreign priority, and further confirmed receipt of the certified copies of the priority documents.

Applicants also appreciate that the Examiner has reviewed and considered the references cited in the Information Disclosure Statement filed October 20, 2003, and appreciate that the Examiner has approved the formal drawings filed October 20, 2003.

Claim Rejections - 35 U.S.C. § 103

A. Claims 1-3 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP 2002-086673 in view of Sarashina et al (US 5,948,466).

JP '673 was cited as teaching the solder paste printing apparatus and method substantially as claimed. Sarashina et al was cited as teaching use of a stencil having a length of 600 mm along its four sides for printing a wiring pattern on a circuit board. The reason for rejection was that it would have been obvious to provide the printing apparatus and method of JP '673 with a stencil of sufficient size so as to enable printing a wiring pattern on a wiring substrate having a length of 300 mm when so desired.

B. Claims 4-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over JP '673 in view of Sarashina et al as applied to Claims 1-3 above, and further in view of Kinoshita (US 6,170,394).

Kinoshita was cited as teaching a solder paste printing apparatus and the conventional use of a solder paste containing solid particles with a size of 20 to 44 microns so that the printed solder layer would be at least 20 microns in thickness; and as also teaching a squeegee speed of 10 mm/sec. With respect to Claims 7-9, the Examiner recognized that the applied prior art may not specify a squeegee printing pressure of 7.5 kgf or more. However, the Examiner considered that one of ordinary skill could readily arrive at the claimed printing pressure through routine experimentation to achieve the desired result.

Applicants respond as follows.

The present invention solves the problems of the prior art (size or height of the solder-printed layers easily dispersed) by disengaging one side of the mask (as shown in Fig. 4) instead of vertically detaching the mask as a whole as taught by the prior art.

The following benefits can be obtained when adopting the non-vertical detaching method of the present invention. The flip chip bumps 46 (or the solder-printed layers) are peeled off sequentially from one side edge to the other side edge of the mask 21. Therefore, the magnitude of the peeling force can be made constant irrespective of the position in the printed face 42. Even on the large-sized wiring substrate 41, therefore, it is possible to form the flip chip bumps 46 (or the solder-printed layers) of a uniform thickness. Moreover, the wiring substrate 41 thus manufactured by that solder paste printing method has such a high quality as is excellent in the connection reliability (page 23, line 20 to page 24, line 7).

Furthermore, it is preferable to start the detachment step only after the squeegee has passed through three quarters or more of the through hole forming region, or more desirably after the squeegee has passed completely over the mask and no other pressing member is present on the mask. If the starting timing of the detaching action is excessively early, the dispersion of the solder-printed layers becomes large among the positions in the printed face (page 14, lines 1-8).

Regarding this last point, as shown in Figs. 4(c) and (d) of JP '673, mask 12 is disengaged from wiring substrate 8 while pressing member 20 is moved across the top of the mask.

To clearly distinguish over the cited prior art, claims 1-3 have been amended to recite detaching the mask by disengaging one side edge of the mask disposed over the printed face of the wiring substrate only after the squeegee has passed through three quarters or more of the

through hole forming region in the mask. None of the cited references discloses this feature of the amended claims or the attendant advantages thereto as noted above and described in Applicants' specification. Rather, the primary reference JP '673 teaches the contrary, namely, disengaging the mask from the wiring substrate while the pressing member is moved across the top of the mask. A full English translation of JP '673 is submitted herewith.

For the above reasons, it is respectfully submitted that amended claims 1-3 are patentable over JP '673 in view of Sarashina et al, and withdrawal of the foregoing rejection under 35 U.S.C. § 103(a) is respectfully requested.

Regarding dependent Claims 4-12, Applicants rely on the response above. Kinoshita fails to make up for the deficiencies of JP '673 and Sarashina et al.

Withdrawal of all rejections and allowance of claims 1-15 is earnestly solicited.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No. 10/687,626

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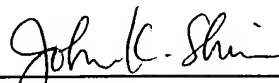
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